

Homework 10

Statistics 411/511: Spring 2018
Due: In class April 11

You do not need to report your answers to this problem in the format according to the Syllabus and *Writing a Statistical Report* available on the course website.

1. Do exercise 14 on page 264 re: the *Pace of Life and Heart Disease* and answer the 4 questions (a)-(d) that your book poses.
 - (a) Generate a matrix of scatterplots in part (a).
 - (b) For part (b), fit a regression model with no interactions. Include a statement of the regression model that includes all parameters of interest. For example, for the Mortality vs. Wine consumption problem from HW7, the regression model was $\mu\{Mortality|Wine\} = \beta_0 + \beta_1 Wine$.
 - (c) Address all of the MLR assumptions, and provide appropriate graphical assessments when answering part (c).
 - (e) After answering (a)-(d) posed by the book, look again at the R-output for this model when using the `summary()` command. State a simpler model that includes only 2 of the original 3 predictors and fit this new model in R. Perform a lack-of-fit test to help you determine whether the simpler model (with 2 predictors) or the more complex model (with 3 predictors) is “better.”
2. Do exercise 19(a) on page 266. In this problem, there is no data analysis component, just write out the regression model.
3. Consider the data set in exercise 18 on page 266 in data set `ex0918` (but do not answer any of the questions there). Fit a MLR to describe the female fly’s ratio of basal length to wing size (in `ex0918$Ratio`) as a function of continent and latitude.
 - (a) Referring to the Chapter 9 notes, which model is better, Model I or Model II?
 - (b) Perform the appropriate diagnostic checks for whichever model you choose.
 - (c) Write out the equation of the line for North America and also the one for Europe.
 - (d) Generate a single graph that includes the data and both lines. Use different colored symbols for the data from the different continents and different colored line types for the regression curve for different continents. Also, include a legend in your plot.
 - (e) Is there a difference in the “speed of evolution” of the female fly in Europe and North America? Write out the model that you are using to answer this question and state the one relevant parameter from this model, the parameter estimate, a 95%CI, and an interpretation in terms of the problem.
 - (f) Is there a difference in the female fly’s ratio between Bozeman (at 45.68 degrees north) and the corresponding latitude in Europe? Hint: *You will need to refit the model from part (a) and use the “shift trick”*